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Lavatories should be situated on each floor, an allowance being made of one bath to every five or six and one wash basin to every ten or twelve nurses. Terra cotta tiles may, again, be used for the floor. For the walls canvas or buckram wainscoating, enamelled white, looks and wears well. Partitions may be of plainly-finished wood, also enamelled. It is well to remember that wood properly finished and enamelled is quite as sanitary as marble. A small tub or sink in which stockings, etc., may be washed is desirable.

A WORD OR TWO ON MANAGEMENT

In charge of the building should be a nurse as "House-Mother" or "Home-Sister." Her regular duties should be sufficiently light for her to have time to look after the pupils in little motherly ways and to do the many nameless things that go to make a real home. One should like her to be a good housekeeper and a good disciplinarian, but the one thing she *must* be is a good woman, sympathetic and tactful. I think it would be excellent experience for a third-year pupil to act as her assistant.

Rules.—As for rules, there should be as few as possible. One should try in all ways for self-government, which can be done through class organization.

IN CONCLUSION

We may choose to call our buildings schools rather than "homes," but homes in the highest and fullest sense they must be if they are to do their part in the harmonious development of our student-nurses, who are also and fundamentally women. Let us, then, aim in furnishing and equipment and management to provide an environment that may, as far as possible, supply what is lacking and counteract what is undesirable in their life in the wards,—and may also speak to them of our Faith and Hope *in* and *for* them and our profession.

ECONOMY IN THE USE OF SURGICAL SUPPLIES

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THE subject of this brief paper is one which is giving much thought and anxiety to heads of hospitals and training-schools, inasmuch as it is a department of hospital work in which the expenses are seen to be as a rule steadily increasing, while measures of control are difficult if not impossible to apply in any usual way. The elaboration of technique in operating-rooms and in surgical work generally, has led to the use of a bewildering variety of supplies, all of a somewhat costly nature, either because of the quality of the article, as in the case of instruments, silver wire, rubber gloves, etc., or in the very large quantities consumed, as, for instance, in absorbent gauze, bandages, cotton, etc. The largest use of these materials is in the operating-room at a time and under circumstances which often make it difficult to give a thought to anything but the patient, and the need of an abundance of such materials as will enable the surgeon to perform his work with the utmost ease, rapidity, and perfection. Nothing else seems for the moment worth considering. As to the cost of the necessary surgical supplies and equipment, this is a matter concerning which those who use them most frequently know the least. An interne at the end of a year's active service in one of our large general hospitals wished to buy on leaving a sample package of every kind of dressing used, for which he came to the supply-room prepared to pay one dollar, and seemed exceedingly surprised when he found that the cost was many times that amount. As to economy in their use, it is to be remembered that economy of any sort is taught in few households at the present time, and that both men and women, the young surgeons who operate, students who make dressings, the nurses who prepare the dressings from the raw materials and assist in applying them, bring into hospitals the habits which they have formed in their own homes. A good-natured carelessness, a serene indifference, or a prodigal and incurable wastefulness, are the typical attitudes which are found among them, and will be recognized by most heads of institutions as familiar stumbling-blocks in the path of true economy and business-like methods. It should also be added that a distinct lack of conscience is frequently seen in the reckless and deliberate misuse of the property of the "institution" by both men and women who would probably be scrupulously careful in handling the property of another individual. In an effort to reach some conclusion, as to the average requirements for the same purposes of surgical materials in common use, a list of questions was sent to about fifty representative hospitals. The information received while interesting has not been in a general way such as would enable us to come to any satisfactory conclusions on this point, but a good many useful facts have been furnished, some of which are here presented.

The most important and costly of all surgical supplies is absorbent gauze. In buying gauze it is cheaper to buy direct from the manufacturer, the usual method being to obtain estimates from different firms and contract for the year's supply. The price paid per yard varies according to the market price and to the weight and mesh of gauze purchased. When possible, and there is a place to store it, a good plan is to take advantage of the markets. One alert superintendent of a hospital last spring took advantage of the low price and contracted for more than a year's supply, with the result that the gauze used in that hospital is only costing them one and five-eighths cents per yard, when the same quality is selling for two and one-tenth cents. Similar saving was effected in buying absorbent cotton. The most remarkable saving in the outlay for gauze has come from the washing and reusing of gauze dressings. Many hospitals are beginning to do this; many more have not made the attempt. Repeated bacteriological tests have proved the entire safety of using gauze that has been washed, and all hospitals that have tried it are proving its great economy. Probably the most striking figures of what can be accomplished along this line are those given by Dr. F. G. Washburn, of the Massachusetts General Hospital, in his paper on "Some Methods of Utilizing Hospital Waste." This practice has been in use to a greater or less degree in the Johns Hopkins Hospital for thirteen years. At first only the large pieces were washed in the ward by the nurses, but for the past eight years it has been sent to the laundry in ever-increasing quantities until it is now estimated that a little less than half of the monthly order of 17,000 yards is reused.

In another hospital where this practice has recently been begun it is stated that they wash all of their gauze and find it perfectly satisfactory in every way, saving thereby $95.00 a month. Each of these hospitals referred to averages about 200 operations a month and uses nearly two-thirds of the amount ordered in the operating-rooms. In striking contrast to this come two other of our large hospitals, averaging only from sixty to seventy operations a month and where no gauze is washed, and where the monthly order amounts anywhere from ten thousand yards to twenty-one thousand yards per month, with only about one third of the number of patients treated. A simple method of washing gauze that could be employed in almost any institution, however small, is as follows: The gauze is placed in the washer and soaked over night in cold water to remove the stains, then washed in warm water, rinsed and boiled one-half hour, rinsed again and the water thoroughly removed in the extractor and sent up to the supply-room, where it is more easily stretched while damp. This method takes no more employees in the laundry, and convalescent patients can always be employed in stretching and preparing it for use. Bandages are always items of great expense unless the material is bought and the bandages made in the institution. A simple contrivance of rollers will roll the gauze or muslin in desired lengths, and these can be readily cut into the widths needed by some one of the hospital employees, such as the relief orderly, or the baggage or parcel man in his spare time while on duty. Dispensary patients should be instructed to wash and bring back each time the muslin bandage taken off at their previous dressing. It is on record that one patient who came three times a week for six weeks to a certain dispensary used only four bandages during the entire time. One hospital reports that they have all their bandages cut or torn by thread, and done by various people, such as orderlies, patients, etc. The bandages used in the ward dressings are never cut, but unwound, washed, pressed and rolled again, a process involving a considerable amount of time and labor. The stub ends of all gauze bandages when unrolled make an excellent absorbent layer for the delivery pads of the obstetrical service when such pads are used. The ends and fragments of gauze bandages left from dressings can be cut up into pieces for washing patients' mouths. A good many hospitals are giving up using plaster bandages, adopting instead the crinoline, which in the majority of instances proves apparently just as satisfactory, much more comfortable for the patients, and much less expensive.

During the past few years the increased demand for rubber gloves in all departments of hospital work has added a very costly item to surgical equipment. Their use varies from twelve pairs a month for 252 operations in one hospital to 300 pairs for 162 operations in another. By proper care and handling of the gloves much can be done to cut down this large expense. In one hospital it is found that boiling them for only two minutes saves the gloves greatly. In the majority of instances they do not boil them at all, but wash, dry, powder and sterilize them in packages. This of course necessitates keeping a much larger stock, as the same gloves cannot be used in succeeding operations, while they can, when simply boiled, be reused. To mend or patch the torn gloves adhesive dam and cement, or a piece of old glove and cement, are the approved methods. Patches should always be put on the *inside,* and the general feeling is that patched gloves last longer if not boiled. When the index-finger is torn it is possible to take a finger from another glove and put it in with cement. The general opinion gathered from the reports sent in, is that the heavy gloves are much more desirable for use, and for that reason more economical. They tear less readily and stand the heat better.

Instruments for operating-rooms are usually ordered by the attending surgeons, and sometimes, but not always, the order must be approved by the superintendent of the hospital. When this method is in force it is often found that what is already on hand will be used rather than face the trouble of explaining and proving the need of something new. The instruments for use in the wards can perhaps be best handled through the central supply-room, which will be described later. A system of exchange of old for new keeps up the standard stock in the ward, and accounts for the use of instruments. The senior nurse in a ward should be made to count daily the instruments in frequent use, and all the ward instruments weekly. Loss or abuse of instruments can usually thus be easily traced. One superintendent says, " No one thing has such a marked influence on individual economy as the taking of regular and frequent inventories." By centralizing the care of instruments better arrangements can also be made for their repair, which is conveniently done weekly, by means of a yearly contract with a reliable firm. Discarded instruments turned in from one department of the hospital can often be put to good account in another. Scalpels with blades worn too small and thin for use can usually be rebladed at a saving of twenty-five cents each. Clamps worn or injured beyond repair may be allowed to accumulate and at intervals of a few months the whole number be sent to the shop to be re-mated. The amount saved on each clamp is usually from thirty to ninety cents, according to the size sent. Worn-out laryngeal mirrors may have the mirror taken off and the handles very easily made into applicators. Handles of old razors may be fitted with new blades or good blades fitted with new handles. Imperfect cautery-points may be sold to the makers for a considerable amount. Scraps of silver wire saved from operations, and ward dressings, will always bring full value for its weight, from the dealer who melts it down for use again. Blunt hypodermic needles can be filed down to a new point. Aspirating and infusion needles may be prevented from rusting on the inside, and so breaking when in use, by being scrubbed, and then rinsed out with ether and alcohol and put at once in a hot place to dry before being wired.

Protective tissue is often used unnecessarily in very many cases, such as the protection of large, wet dressings, and in dispensary work its place in the New York Hospital is cheaply and effectively taken by paraffin paper. At two cents a sheet it has proved as satisfactory a covering as protective at twenty-five cents a yard. Many complaints are made of protective rotting when left in bichloride, and one hospital tries to prevent this by taking it out after forty-eight hours and laying between strips of sterile absorbent cotton. A reliable pharmacist states that the whole trouble lies in the quality of the protective purchased and not in the way it is prepared. In the hospital with which the writer is connected there has been no trouble of this nature, and the protective remains in the bichloride solution for an indefinite period. This quality of protective is obtained through the firm of George P. Thomas, Jr., of Baltimore.

Ligatures and sutures are among the very costly operating-room materials when purchased ready for use. In most large hospitals the nurses prepare the various kinds used, according to definite formulæ. It is found that 180 tubes of catgut from Van Horn cost $37.50, while the same amount prepared by nurses costs $10.00. Of course the time required in preparation must be considered, for it takes a nurse the better part of two days to complete its preparation; but as the nurse must usually be on duty anyway, her time in this instance is not additional expense. One operating-room nurse writes that "by chromacizing our own catgut we save a great deal. For 500 strands it is $35.00 cheaper than Van Horn's and equally good." All pieces of catgut left may be put in absolute alcohol and used for accident cases. Horse-hair as a suture material is mentioned as coming into favor with some surgeons. It costs almost nothing and is very fine and strong. It is prepared for use by scrubbing with green soap, boiling well and soaking for several days in bichloride. It is used chiefly in skin wounds, but sometimes in deeper work, and takes the place of much of the silk formerly used.

Silver foil is still used in some of the large hospitals and sometimes extravagantly. In one instance it was the custom to sterilize a whole book of twenty sheets in each package, and whoever did the dressing would continue to apply it to the wound as long as the package lasted. The packages were then reduced to ten sheets to see what the result would be, but no notice was taken of the change, the dresser apparently being satisfied if he was allowed to finish the package.

Ether, as an anæsthetic, is an extremely costly item in the surgical expenditure of any hospital. In one operating-room, where the drug bill for the year was $2,100.00, the ether alone cost $1,025.00. The same hospital found it much cheaper to begin anæsthesia with nitrous-oxide gas, changing to ether when the patient became unconscious The drop method of administering ether is said to reduce the amount used very materially, but three months' observation of its use in one place showed that the amount ordered remained the same. One superintendent writes that by the discontinuance of ether in skin preparations (with equally good results), it is estimated that $400.00 yearly will be saved in that hospital. An inexpensive and satisfactory ethercone can be made of a straw cuff, such as butchers wear, turned in, and covered with a towel pinned on. The towel comes off and the cuff is easily washed. A careful, conscientious, competent nurse can very decidedly influence the use of almost all materials in her department. For instance, in one hospital in the matter of catgut alone one nurse was able to effect a saving of many dollars every month as compared with her predecessor, by her careful management of the ligatures and sutures. This was accomplished by cutting the sutures the required length in their preparation, and not having the tubes opened until the operator was ready to use them, and saving all ends for dispensary use. A considerable saving in the amount of solutions and alcohol used was also effected by this same nurse, the measures used not being stated. In one hospital a good method was introduced by the head nurse of a large surgical ward of having a basket filled with simply enough supplies and dressings, and no more, for the students' needs each day. They had been accustomed before this to help themselves freely from the dressing carriage, and when the staff doctor arrived to make rounds she usually found her carriage depleted of almost everything needed. The recent introduction in several of the large hospitals of a central supply-room for surgical materials is conceded by those who have tried it to be a source of considerable economy. Here under the expert supervision of one good competent assistant, all the materials used are kept. Here the weekly orders from all departments in the hospital for the necessary surgical supplies required for use are filled from orders that have been carefully gone over by the superintendent of nurses and signed. The monthly requisitions for all stock materials, including instruments, rubber gloves, needles, splints, etc., are, after being carefully examined by the superintendent of nurses, prepared on special order sheets, for the final approval of the superintendent of the hospital before ordered. Here also the record books of materials ordered, prices paid, and the amounts used by different departments are kept, so that at a glance each month it is possible to tell exactly how much the different departments in the hospital have spent for surgical supplies. A simple printed stock card is kept and sent to the superintendent of nurses' office daily, so that she can see what is used, how much material is on hand, and how soon it will be necessary to order more. Under this method of supervision it is almost impossible for any department to increase its demands for supplies without its being quickly detected and properly investigated. As the activity of the various wards fluctuates it is possible through a central supply-room to furnish each ward, daily, exactly what it needs, and it is no longer necessary to keep any ward overstocked to meet an occasional increased demand. Dressings, too, are cut to much better advantage in large quantities, and measurements of special pads can be adjusted in cutting from the full bolt of gauze so as to have absolutely no waste. In one hospital it was found that enough gauze for the sponges for ward dressings could be provided by reducing slightly in size the fluffs or handkerchiefs, a process which did not interfere in any way with their original value as a dressing. Thus the sponges were provided, and 500 yards of gauze saved a month. In all cases where it was necessary to trim the gauze, these clippings were saved and used as an absorbent layer for the top of pads in place of absorbent cotton. The use of cotton pads in surgical work is steadily on the increase, and replacing the much more expensive gauze pads, which usually cost about sixteen cents each and have to be much more frequently changed than the cotton ones. These cotton pads when made in bulk, using a good grade of absorbent cotton that will separate evenly four or five times, as a light absorbent upper covering, are a very economical dressing. It is estimated that large-size pads made this way cost about three cents each, and the smaller perineal pads two and a half cents each. A good grade of cotton waste, at seven or eight cents a pound, such as is used by engineers for cleaning purposes, can be made absorbent by boiling in a soda solution, and makes an excellent foundation for obstetrical delivery pads. In this central supply-room the medicated gauze for the entire hospital can be readily made. Iodoform gauze for drains is an expensive item, the bill in one hospital last year for the powder used in the general surgical operating-room alone amounting to $360.00. This did not include gauze used, or time necessary for its preparation. Very few rolls should be put in the packages; even then odd rolls may be left over from operating-room use. These can be returned to the supply-room, resterilized and used in ward and dispensary dressings. Only small quantities of bismuth gauze should be made up at one time, as it seems that ten days is the longest time it can be kept without rotting. Dressings are conveniently, and economically sterilized in packages. Glass jars will break, wire crates and metal boxes need much cleaning and often rust, but a soft package is a safe, fresh, light method to employ. (Mention is made of a new kind of metal case for sterilized dressings which is described as most economical, well arranged and time saving; but as yet this appears to be used in only a few hospitals.) These dressings, properly prepared, sterilized and ready for use, are arranged in good order in the supply-room, on shelves with divisions clearly marked for each kind of article used. Requisitions for surgical supplies for the next twenty-four hours are sent in to the superintendent of nurses from each ward in the evening, approved by her and distributed in the morning by the nurse in charge of the supply-room. It is well to arrange that in each of the wards a shelf is set aside somewhere, where all opened packages of dressings and empty dressing covers are placed after the daily rounds are over. These can be gathered up systematically twice each day and much gauze is thus returned for legitimate use, which would otherwise be used up in various unsuitable ways in the wards. The wrappers or dressing covers are best made of two thicknesses of unbleached cotton, and should have the name of the contents stencilled on one corner, which is so folded as to come on the outside and be clearly seen. Cotton is more durable than linen under the adverse conditions of high pressure and steam, and is much cheaper to replace. One hospital reports that it was a year and a half after introducing the cotton wrappers that any were worn enough to exchange. Previous to this the linen covers used only lasted six to eight months at the longest. The matron of this hospital stated that this change meant an annual saving of about $200.00. The proper adjustment of dressing towels in this same institution has for many years been a great problem, although each ward was supplied with a large and ample standard; still, there never seemed enough to meet the demand. The towels were finally taken out of the wards by the superintendent of nurses one year ago, placed in a central supply-room, and ordered daily on the supply slips as surgical dressings. Since this method went into effect there has never been any complaint in the wards of not having a sufficient number for use, and there is always a reserve stock on the shelf for emergencies. The amount of linen used in operating rooms is a serious question. There is apparently no limit to its extravagant use in some places, while in others, equally successful work is done with a very much smaller supply. In one hospital 80 towels is the average number used for an operation, while in another with apparently equally good results 16 is found sufficient for the same purpose. It is well to say here, that while this matter is to a large extent governed by the wishes of the surgeon, the head nurse must not feel that she has no responsibility in the matter, for with proper and judicious management and tact, she can by a word or look restrain her assistant nurses in the too hasty opening of fresh packages of towels before they are needed, and teach economy in the linen that is crushed, but not soiled, by taking these towels for minor dressings and hand use after the operations are over. One large hospital has very recently adopted the plan of having the linen ordered daily by the head nurses directly from the laundry. A requisition is sent in every day, all surplus linen going to a central supply-room, whence it may be procured in emergencies. This system means placing a value on the clean-linen supply, and at once, it is said, reduced the amount sent to the laundry by one quarter. This perhaps would not have so much influence on the use of linen in operating-rooms, for there it will probably remain to a large extent a matter under the control of the visiting surgeons in common with other surgical supplies.

It is of course a poor economy which fails to provide enough good suitable material and appliances for whatever work is necessary, but the tendency at this moment is not in that direction. It is rather toward the restriction of the usefulness of the entire institution, by lack of proper control, of one of its most costly departments, and constant vigilance in the handling of its smallest detail. Measures which are necessary in the successful conducting of any ordinary business cannot be ignored in the great business of carrying on the work of large charitable institutions.

ECONOMY IN SURGICAL TECHNIQUE

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ECONOMY in the use of materials, as also of labor and time in surgical work, is to so great an extent dependent on the technique employed that we cannot consider one without the other. It is an important subject to us as administrators of hospital funds and instructors of nurses, to take into consideration this ever-increasing elaboration of detail in surgical technique, involving greater expenditure of material and possibility of waste, and by our combined efforts with the knowledge we can derive from our many hospitals, evolve a scheme of work that shall combine principals of good technique with simplicity of method.

We might ask ourselves the following questions:

1. What is the purpose and necessity of surgical technique?
2. What are the minimum requirements for aseptic technique?
3. Are the results as good with a simple method as with an elaborate and complicated system?